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Level of asthma control and frequency of emergency visits during COVID 19 pandemic: Cross sectional study

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ABSTRACT

Asthma is a chronic respiratory illness associated with sudden attacks of shortness of breath that require emergency visits. Asthmatic patients were harmed by the pandemic because they were unable to receive regular follow-up. This cross sectional study was conducted in Riyadh, Saudi Arabia to assess emergency visit differences before and during the pandemic. An online survey of asthma control tests and other demographic information about the people who took part was also used to measure how well asthma was controlled. The results highlighted that there's no difference between pre and during pandemic emergency visits. Additionally most patients were poorly controlled according to the asthma control test. Asthma control test results in Riyadh come in the mid-range if compared to studies at other locations in the kingdom. There was a link between smoking and increasing emergency visits and not doing well on control tests. Asthmatic patients should be told to stop smoking for their own health and to make it easier on health authorities.

Keywords: COVID 19, asthma, emergency

1. INTRODUCTION

With cases reported across the globe, the 2019 novel corona virus (SARS-CoV-2) is a brand new human corona virus that was discovered in China. This new corona virus illness (COVID 19) is connected to a respiratory condition that can cause acute respiratory distress syndrome and severe pneumonia (ARDS). Even though COVID 19 is related to the severe acute respiratory syndrome

(SARS) and the Middle East respiratory syndrome (MERS) (Petrosillo et al., 2020), it has some strange pathogenic, epidemiological and clinical traits that are still unknown. One to 18% of people around the world have asthma and 11.3% of people in Saudi Arabia have asthma (Al Ghobain et al., 2018). The most recent revision of GINA guidelines emphasized the significance of maintaining proper asthma control during the epidemic and urged asthma patients to adhere to their plan in the event of worsening asthma symptoms (Pfefferbaum & North et al., 2020). Sheha et al., (2021) said that good asthma control is important to reduce the risk of asthma attacks and death in the future.

Contact between asthmatic patients and a health care professional is essential for effective asthma management. Also asthma patients need to be checked on regularly by a doctor or other qualified health care professional. And during lock down it is impossible to conduct routine monitoring for treatment modification (CDC et al., 2020). Patients with asthma may find the COVID-19 outbreak stressful, especially in light of the CDC's caution that people with chronic illnesses run a higher risk of developing severe COVID 19 illness (NIH et al., 2003). Many studies discovered that smokers' asthmatic patients were poorly controlled by their disease (Thomson et al., 2013), which may be considered as a cause for their multiple emergency visits. Most of the studies highlighted that emergency visits by asthmatic patients decreased greatly during the pandemic, which might be attributed to many factors for example, the effect of lock down on decreasing exposure to allergens (quintyne et al., 2021), and also the patients' fear of getting COVID infection during their presence in hospital (blforguk et al., 2020). Due to a lack of studies about asthmatic patients' emergency needs before and during the COVID pandemic, we conducted this research to explore the difference in emergency needs for asthmatic patients in the two situations, as well as to apply an asthma control test for the participants and correlate its results with demographic and other patients' characteristics.

2. MATERIALS AND METHODS

This cross sectional observational study was conducted at Riyadh Saudi Arabia in the period from 15 Jul to 15 Sep 2022, to evaluate asthmatic patient's emergency visits before and during COVID pandemic. Online questionnaire was sent through social media to asthmatic patients in Riyadh Saudi Arabia. We will include 89 patients with bronchial asthma older than 18 years, who diagnosed as asthmatic at least 6 months prior. Patients not speaking Arabic or English parents less than 18 years age, patients with confirmed COVID 19 infection and patients diagnosed as asthmatic within 6 months were excluded from the study. The questionnaire include; personal and medical data (age, gender, smoking status, associated allergies etc.), triggers and risk factors of bronchial asthma (mold, house dust, pets etc.), Arabic version of asthma control test questionnaire (Durevage et al., 2017) translated by UAE health authority which consist of 5 questions each question score 1 of 5 and the total score give a clue about the level of asthma control as follow; score of 25 indicate asthma is completely controlled, Score of 20 - 24 indicate asthma is controlled, Score of 19 or less indicate that asthma is not well controlled. Additional to questions about emergency department visits.

Data statistical analysis was performed using SPSS version 24. Frequency was used with qualitative data, mean \pm standard deviation was also used for quantitative variables; multiple regression analysis was performed to show the impact of certain demographic and clinical variables on asthma control test. Paired samples T test was done to compare the mean of emergency visits before and during the pandemic. Association between quantitative variables was tested using Pearson correlation coefficient. P value of 0.05 or less was regarded as significant. Data confidentiality was ensured to study workers. Informed written and oral consent was obtained from all participants in the study. Additional informed consent was taken from individuals for whom identifying information is included in this manuscript. From KSMC ethical approval was taken and (H1R1-07-Aug22-02) is the reference number. In accordance with the needs of the research facility all of the forms were securely stored and managed in secret. In this investigation no personal details or patient names were revealed. Investigators, statisticians and data collectors will be the only ones with access to the data once it has been saved. There was no funding for this study and the researchers had no vested interest or bias.

3. RESULTS

89 known asthmatic patients were a part of the study, with mean age of 38.4, SD 13.8. 50.6% of participants were smokers and all of them had associated allergies with asthma (Table 1), additionally 73% were in regular follow up. According to Asthma control test categories the majority of participants were poorly controlled 79.8% with no one score as fully controlled (Figure 2). Triggers and risk factors of bronchial asthma were recorded in (Table 2), (Figure1). Paired samples T test was used to evaluate the impact of COVID pandemic on the frequency of emergency visits by asthmatic patients, there was no statistically significant difference in the mean, before pandemic (M 7.9, SD 5.8) and after pandemic (M 7.0, SD 9.6), P value 0.302. Non smokers were less likely to visit emergency department pre and post the pandemic, (P correlation 0.411, 0.258; P value 0.000, 0.015) respectively. The results also

emphasize that patients on regular follow up were less likely to visit emergency department during the pandemic (P correlation 0.241, p value 0.023).

Using SPSS multiple regression analysis was done to check the effect of (age, gender, smoking status and Number of allergens) on asthma control test scale, significant results was reported with gender, smoking status and number of triggers (P correlation 0.226, 0.438, 0.252) respectively. Independent variables have not violated multi Col linearity assumptions (VIF for all independent variables > 1.0). Outliers, linearity, normality and homoscedasticity were tested using normal probability (P-P) plot of standardized regression residual, all points lie in a reasonably straight diagonal line from bottom left to top right, which indicates there is no major deviations from normality (Figure3). Our model which includes (Age, gender, smoking status and number of triggers) explain 48.7% of the variance in asthma control test scale ($R^2 = .487$). Regarding standardized coefficients Beta value it's greater for smoking status (beta= .368, Sig .000) indicating it was the most independent variable affecting the scale. Followed by Gender, number of triggers and age (Beta .167, .152, .011) respectively (Table 3).

Table 1 Demographic characteristics

		Frequency (Percent %)
Are you on a regular follow up?	Yes	65 (73.0)
	No	24 (27.0)
Gender	Male	44 (49.4)
	Female	45 (50.6)
Smoking status	Smoker	45 (50.6)
	Non-smoker	44 (49.4)
Associated allergies	Yes	89 (100.0)

Table 2 triggers of bronchial asthma

Trigger	Frequency (%)
Mold	38 (42.7)
House dust	63 (70.8)
Pets	38 (42.7)

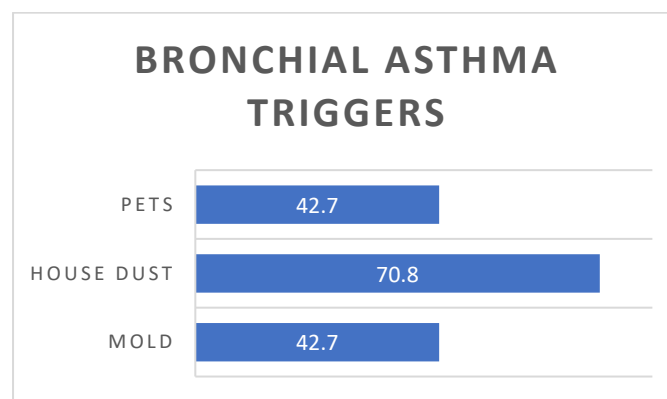


Figure 1 triggers of bronchial asthma

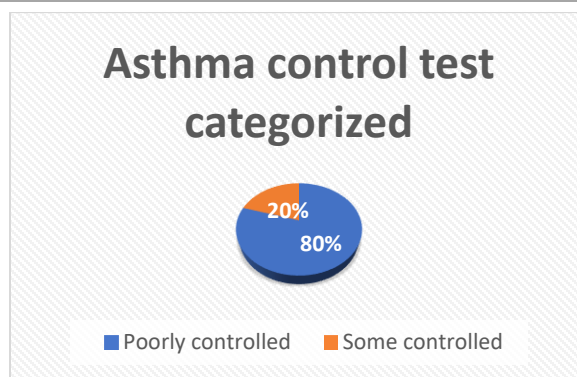


Figure 2 asthma control test

Table 3 multiple regression analysis

Coefficients						
	USD		SD	Sig.	95.0% CI for B	CS
	B	Std. Error	Beta			VIF
(Constant)	8.475	2.013		.000	(4.473 -12.477)	
Age	.003	.027	.011	.913	(-.050 - .056)	1.038
Gender	1.264	.745	.167	.094	(-.219 - 2.746)	1.064
Smoking status	2.792	.765	.368	.000	(1.272 - 4.313)	1.120
Number of triggers	.770	.505	.152	.131	(-.235 - 1.774)	1.096
a. Dependent Variable: Total ACT b. Abbreviations: B; regression coefficient, SD; Standardized Coefficients, USD; Un standardized Coefficients, CI; Confidence Interval, CS; Col linearity Statistics, VIF; variance inflation factor, Sig; p value c. P value of less than 0.05 was considered significant						

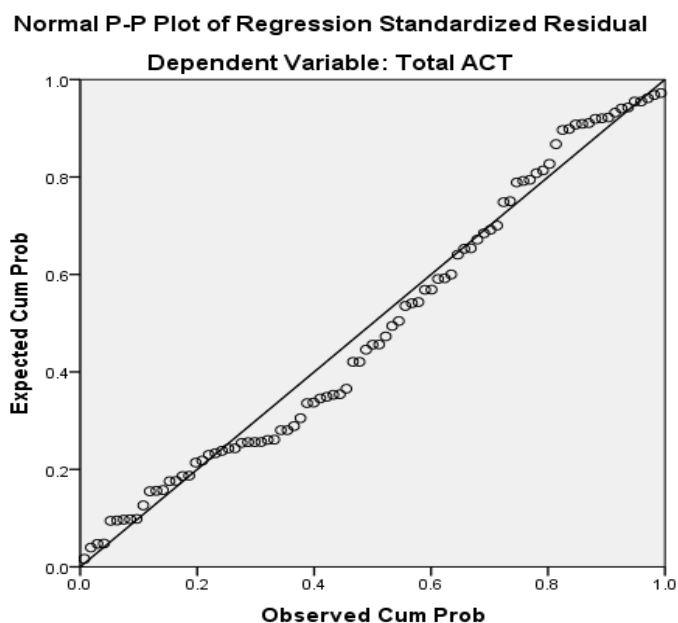


Figure 3 normal probability plots

4. DISCUSSION

Asthma is one of the most prevalent respiratory diseases it but significant burden on the health system also increase the mortality and emergency visits. In Saudi Arabia 2 million individuals were affected (Al-Moamary et al., 2012). It's well known that non controlled asthma have a negative and exaggerated impact on individual and health system, so this study comes to test asthma control among the participants and emergency visits frequency before and after COVID pandemic. Our study showed that 79% of participants have uncontrolled asthma this percentage was higher if compared to a study conducted in Makkah 58.8% (Alansari Mirza et al., 2020). But lower if compared to Riyadh (95%) and Taif (88%) (Al-Jahdali et al., 2008; Al-Zahrani et al., 2014) in Denmark 30.8% of asthmatic patients were poorly controlled in Portugal the percentage is slightly higher 43.3% (Von et al., 2014; Sá-Sousa et al., 2006). Our study found that females are more prone to have a good asthma control test if compared to male also non smoker's asthmatic patients tend to score higher than smokers in asthma control test. A study was conducted by Colombo et al., (2019) found no significant difference in asthma control scale between genders while asthma exacerbation is more severe among females. According to another study conducted by Mc Callister et al., (2013) asthma control was shown to be similar in both genders while females reported increase in environmental triggers and coughing.

Triggers (house dust, mold and pets) were tested against asthma control scale not according to expectations results reported that asthma control test scale is better among participants with the largest number of triggers (P correlation 0.252, P value 0.017) the strongest correlation was shown with pets. Results also showed that house dust is the most prevalent trigger 70.8% (Figure 1). (Alansari Mirza et al., 2020) study in Saudi Arabia highlighted that dusts and detergents were the commonest triggers among asthmatic patients. Also the results indicate that smoking is the most independent variable affecting the asthma control scale (Beta; 0.368). Despite a limited data of exact pathological mechanism by which cigarette smoking induce asthma this might be attributed to the fact that smoking modifies inflammation associated with asthma attacks (Thomson et al., 2004). (Laforest et al., 2006) study also used asthma control test ACT to relate asthma control with certain patient's characteristics including smoking, smoking was considered as a determinant of inadequate asthma control. Thomson et al., (2013) and Leuppi et al., (2006), both used ACQ (asthma control questionnaire) scores to assess asthma control in smokers both of the studies highlighted that smokers were less likely to develop a good score in the questionnaire.

According to this study no significant increase in the emergency visits of asthmatic patients was detected before and after COVID pandemic. With the mean number of visits slightly higher in pre pandemic situation a large study included 500,000 participants was conducted by Shah et al., (2022) found a great decrease in emergency visits during COVID pandemic for male and female. Previous studies in the same field suggested many reasons for the significant reduction of asthmatic patient's emergency need during the pandemic. These include the fear of patients to get COVID infection while they visited emergency department and hospital (blforguk et al., 2020), decrease in air pollution (quintyne et al., 2021), pandemic reduced mobility so the circulating other respiratory viruses also the hygiene and protection was improved during pandemic (Gupta et al., 2020).

5. CONCLUSION

The study concluded that there's no difference between emergency visits of asthmatic patients before and during the pandemic also we concluded that all participants had associated allergies with asthma. The majority of patients were poorly controlled of their disease. Smoking associated with increased emergency visits and poor asthma control regular follow up associated with less emergency visits.

Author's contributions

Faheem Mohammed alanazi: (Principal investigator): Participated at every stage of the research process from proposal drafting through report writing and over saw the entire project.

Abdul majeed Haddaj Alruwaili: Been involved in every stage of the research process from proposal to report

Abdulrhman Fahad Almutairi: Was responsible for drafting the proposal, gathering data and participating in most stages of the study process.

Sameh Ahmed: Was responsible for the introduction's final draft and data collecting and participated in virtually every stage of the research process from proposal to report.

Ahlam Saud H Alabbad: Was in charge of creating the questionnaire, gathering data and analyzing it and participated in most of the other stages of the study process as well writing to the conclusion.

Asalah Abdulaziz H Faqih: Participants participated in all stages of the study process (from proposal to conclusion) with a focus on discussion and conclusion writing.

Erum Ali Almarhoon: Collaborated on the research from its inception to its end, including but not limited to questionnaire development, data gathering and analysis.

Ghaida Ali H AL Zaher: Contributed to the research proposal, data collecting and analysis, and conclusion drawing processes.

Khaled Mohammed H Almutairi: Assisted in drafting the research's discussion and conclusion; helped to the research's development from concept to final report.

Khalid Mohammed Alghamdi: Collaborated on the research from its inception to its end, including but not limited to questionnaire development, data gathering and analysis.

Malikah Zaki Alshaikhmohamed: Participated in collecting literature relevant studies also at discussion and results writing.

Mohammed yahya M alalkami: Participated in collecting literature relevant studies also at discussion and results writing.

Muhannad Ali S Alshahrani: Participated in collecting literature relevant studies also at discussion and results writing.

Omar Mebrek M Almutairi: Participated in collecting literature relevant studies also at discussion and results writing.

Further information

All writers have confirmed that they have no current or historical financial relationships to any entities that might have an interest in the submitted work. In addition each author has confirmed that "they have no additional affiliations or activities that may be viewed to have impacted the work that has been submitted."

Data materials availability

Data that support the findings of this research are embedded within the manuscript

Abbreviations

GINA; the Global Initiative for Asthma guidelines, gin asthma, Global strategy for asthma management and prevention, ACT; asthma control test, CDC; centre of disease control, COVID 19; Corona virus disease 2019, ARDS; Acute respiratory distress syndrome, SARS; severe acute respiratory syndrome, SPSS; Statistical Package for Social Sciences.

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Conflict of interest

The authors declare that there is no conflict of interests

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